

invaded the area, occupying stumps which come to or nearly to the water surface. On certain of the higher stumps may be found almost an intermingling of these forms with the surviving epiphytes.

SUMMARY

1. Barro Colorado Island in the lowland tropical rain forest of the Panama Canal Zone has 72 known species of ferns and fern allies.

2. Very few of these species figure as clearing pioneers.

3. Ferns are frequent in second growth forest and abundant in primeval forest as underherbs, none of the upland forms being more than about one meter high.

4. Terrestrial ferns are most abundant in the ravines, where the flora includes two rather plentiful tree ferns.

5. A group of fern species is characteristic of the marsh formations in Gatun Lake.

6. There are numerous epiphytic ferns of both the tufted and the trailing types. Some of these are sufficiently resistant to persist on the exposed dead stumps in the lake.

WESTERN (MICHIGAN) STATE TEACHERS COLLEGE

Collecting Horsetails along the Way¹

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The summer of 1927 was spent in taking a camping trip with my family to the Yellowstone National Park and although the main purpose was merely recreation and sight-seeing some botanizing was done and my special friends, the Equisetums, received their proper share of attention. Controlling the steering-wheel of an

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automobile interferes somewhat with the recognition of the wayside plants, yet one can soon learn to recognize the proper habitats and to accumulate a respectable collection in his plant press.

We left Columbus, Ohio, on the second of July, which was not too late for finding most of the horsetails in good condition north of the 40th parallel. West of Elkhart, Indiana, several large patches of *Equisetum kansanum* showed up prominently on the railway which passed along the road. On the top of the railway track there were tufts of slender plants about 6 in. high, many of the shoots with tiny cones, while along the right-of-way there were typical plants 1½–2½ feet high. The dry railway seemed to make an ideal habitat for this somewhat xerophytic species. In the Dunes State Park of Indiana, with its remarkable sand dunes, and also east of Gary the more robust *E. laevigatum* was found. *E. arvense* was, of course abundantly distributed all through northern Indiana. Both *E. kansanum* and *E. arvense* are abundant along the highway near Joliet, Illinois, while a little farther on, at Aurora, *E. laevigatum* was again collected. At Dubuque, Iowa, only *E. arvense* was noted but farther west, at Waterloo, *E. laevigatum* was again seen in abundance. *E. arvense* and *E. laevigatum* seem to be the common species all through northern Iowa. The *E. laevigatum* often grows tall and robust with large prominently apiculate cones. It was also collected at Newell, east of Storm Lake. *E. kansanum* was seen at Cedar Falls, at Lake Okoboji, and near Larchwood. As one approaches the limit of the typical prairie, *E. laevigatum* becomes rarer and *E. kansanum* is the common species.

After passing over into South Dakota, *E. kansanum* was collected on clay banks along the road at Sioux Falls and at Salem. At Mitchell we visited the campus

of South Dakota Wesleyan College where the writer taught for a season many years ago when the country was still in its pioneer stage. Both town and college appear unusually progressive and up to date. *E. kansanum* was next collected in bare sandy soil in the Missouri River valley near Chamberlain. After passing through the Bad Lands, beyond Scenic, it was collected on the wet, sandy banks of the Cheyenne River. It will be noted that at each prominent climatic stage, westward, the species descends to a lower habitat. At Rapid City the influence of the Black Hills is manifest and here both *E. arvensis* and *E. kansanum* were common.

On the road past "Game Lodge," the "summer white house" for 1927, we had the pleasure of getting a glimpse of President Coolidge himself. As his automobile passed ahead of ours he waved his hand in friendly greeting even though we were only "sage-brushers" and horse-tail hunters. In the Custer State Park of the Black Hills, *E. arvensis*, *E. kansanum*, *E. praealtum*, and *E. silvaticum* were collected. The last named species was abundant at one place, in an open forest in sandy soil along a brook. It was not seen at any other place during the entire trip. Along the high, north-facing bluff of the creek at Spear Fish, *E. praealtum* was abundant.

Beyond this we passed into Wyoming through a gateway which bore the admonition, "Stop roaming, try Wyoming," and soon the weird form of the Devil's Tower came into view. There is a large, pure spring and a fine camping ground at its base. In the flood plain and banks of the Belle Fourche River, which we crossed by fording, *E. kansanum* and *E. arvensis* were collected. At Buffalo, which is near the Big Horn mountains, *E. arvensis*, *E. kansanum*, *E. laevigatum* and *E. praealtum* were present. The *E. laevigatum* was growing abundantly along the sandy banks of a creek and extended down into the water.

From Buffalo to Tensleep, the road extends over Muddy Pass, altitude 9666 ft. Here there were large snow fields still unmelted so we played snowball (July 14) and gathered the low alpine flowers. At a lower level *E. arvense* was observed. In this region the highland meadows are carpeted with blue lupine and purple larkspur together with many other flowers which make colorful patches contrasting wonderfully with the green coniferous forests.

At Tensleep, *E. kansanum* and *E. nelsoni* were collected on wet, sandy-gravelly island-bars in the creek. Finding *E. nelsoni* at this place was quite a surprise, but there it was with unmistakable characters, not to be confused with small tufted forms of *E. kansanum* or *E. laevigatum*.

We arrived at Cody rather early in the afternoon and after pitching camp I wandered down along the Shoshone River, hoping to find a suitable habitat for some *Equisetum* at this low level. After walking a long distance and being just at the point of giving up the search, I found *E. kansanum* growing in the water-soaked bed of an overflow channel in the flood plain.

In the Yellowstone National Park, because of its high altitude, *E. arvense* is abundant in many places. One day as I was walking up a little slope of the creek gorge above Tower Falls, the ground was carpeted with this species and noticing a path up through it, I decided to explore the place for others. After going a few rods, I suddenly met a large, sleek black bear. I had not yet become accustomed to bear and meeting one alone in the woods was a new experience for an *Equisetum* collector. I looked at the bear and the bear looked at me. We both seemed to arrive at the same general conclusion. He turned back and went up the slope and I turned back and went down the slope. I concluded that there might be some interesting *Equisetums* in another direction and

surely enough down at the bottom was a fine patch of *E. kansanum* growing in rich leaf mold with sand beneath and somewhat shaded by conifers. Several of these plants had surviving bases of 1 or 2 internodes, of the previous season's shoots, down in the leaf mold. This is unusual and was probably due to an early and deep snow cover during the previous winter. Had it not been for the bear this interesting patch might have been overlooked. After one of these friendly animals had tried to carry away our sack of sugar, my urban timidity gave way to a feeling of familiar contempt and indifference. Along this gorge, both above and below Tower Falls, *E. hiemale* is abundant. This species, along with other Pacific Coast plants, comes over, through the region of the national boundary, into Glacier National Park and evidently extends north and south along the mountains from that point for some distance. The specimens from Tower Falls have the normal characters for *E. hiemale* and are readily distinguishable from our eastern *E. praealtum*. The species grows abundantly in the deep wet misty gorge below the falls. I had collected some shoots and was sitting on a rock examining them with a hand lens when a lady from Utah, who was passing by, called out: "Now you *will* see snakes." She called the scouring rush "Snake-grass" and said that when a child they had a superstition that wherever Equisetum grew snakes would surely abound. Earlier on the present trip a boy from Wisconsin whose father was also botanizing had told me that the boys at home always called it "Snakeweed." I had never heard these names before although they appear to be common in widely separated regions. Britton and Brown give "Snake-pipes" as a common name for several species.

Along the creek below Mammoth Hot Springs, I collected *E. kansanum*, *E. hiemale*, and *E. variegatum*.

The last named species was growing in about the same kind of habitat as the *E. nelsoni* at Tensleep, namely on wet gravelly sandbars of the creek bed. Along the same creek near Gardner, Montana, several miles north, *E. hiemale*, *E. arvense* and *E. kansanum*, were collected. Dwarfed specimens of *E. kansanum* were observed in a dry grassy meadow along the Firehole River, between Madison Junction camp and the lower Geyser Basin. Many of the fruiting plants were not over 4 in. tall. They were not tufted but were mostly single shoots growing out of the ground. Of course, the eruption of "Old Faithful" and other geysers distracted attention from Equisetum for a time and there were also comedies and tragedies. At West Thumb Camp while looking for plants at the margin of the hot spring area, I noticed a wild duck and five little ducklings, which had recently been scalded to death, floating in one of the hot pools. The next morning the three young members of the family wanted to see this wonder and after various surmises as to the cause of the tragedy we were returning through the pool district when suddenly before me stood a woman and her companion in tears of anguish. The lady was weeping violently as though she had lost her first born, and with the fate of the ducks fresh in mind I wondered whether some child might have fallen into one of the hot pools. Going up to find out the cause of the trouble it developed that their beautiful spotted bird dog had been missing since the evening before and there he lay well-cooked at the bottom of the deep hot pool—a heart-rending tragedy to the owner of the dog but somewhat of a comedy to an unsympathetic Equisetum fiend. After leaving the Park by the south entrance, typical *E. praealtum* and *E. kansanum* were collected along the Snake River. Here also were observed the small stunted forms of the latter species, growing in a dry short-grass plot, like those along the

Firehole River. A little farther south, along a brook margin, *E. arvensis* was collected.

No horsetails were seen at Moran but we bought some gasoline at 40 cts. a gallon. Later we bought the same kind of gasoline in Kansas for 17 cts. At Dubois two species were present along the creek, *E. arvensis* and *E. kansanum*. The *E. kansanum* was found on the moist creek bank and in an old dry, abandoned creek channel, growing together with the xerophytic sagebrush. It was probably receiving water through underground seepage from the creek. Here all gradations of semi-sterile cones were observed, from completely sterile shoots to normally large, fertile, cone-bearing shoots. A series of gradations of lengths of peduncles was also observed, ranging from 0 to $\frac{3}{4}$ in. in length. The peduncles also varied from nearly pure green to yellow. The minute sterile cones are on shoots with slender tips while the large fertile cones are on robust tips. At Lander, *E. arvensis* and *E. kansanum* were both abundant and the same two species were again collected 44 miles south-east along the Sweetwater River. At Rock River only *E. kansanum* was observed in the creek bottom.

At Laramie, we stopped long enough to see the University of Wyoming and to call on Professor Aven Nelson in his fine herbarium. I was much interested to learn that the day was an unusual one for Dr. Nelson, since it was his anniversary of forty years of service at the University. It was just 40 years before on July 25, that he had arrived in Laramie to begin his labors for the advancement of botanical science in a region just emerging from pioneer conditions. Wyoming was still a territory.

After passing into Colorado, *E. kansanum*, *E. praealtum*, and *E. arvensis* were collected along the road from Lyons to beyond Estes Park. At Ft. Morgan, *E. laevigatum* was found on the sandy banks of the South Platte

River. The same species was seen at Wray, Colorado. In northwestern Kansas, at St. Francis, *E. laevigatum* was found on the wet sandy banks of the Republican River while *E. kansanum* was growing in a grassy creek bottom near swampy ground.

No more Equisetum was seen until we were going through the broad Republican River valley, north of Concordia, where tall *E. laevigatum* was present in abundance along the road. Finally we arrived for a five-weeks' stay at our Prairiedell Farm, near Morganville, Kansas, where *E. kansanum* grows in suitable habitats on the upland, especially on clay banks and *E. laevigatum* on the flood plain of the Republican River. *E. praealtum* also grows along streams but is seldom found and the same is true for *E. arvense*. For over 30 years I have only seen *E. arvense* persisting in one spot. On the farm of my old friend, Jules Desjardins, is a perennial spring, flowing out of sandstone into a creek bottom, and here a few individuals of *E. arvense* struggle along through wet season and drought, from year to year, with some individuals of *Woodsia obtusa* as neighbors. They would have to travel many miles to find another suitable spot in which survival would be possible.

COLUMBUS, OHIO

A Note on *Asplenium pinnatifidum* Nuttall

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For some time the occurrence of *Asplenium pinnatifidum* Nutt. in New England has been questioned. In 1920 the Committee on Floral Areas of the New England Botanical Club stated (4) that, "*A. pinnatifidum* is reported from Sharon and Southington, Conn. The